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/Nick/Steve

**What is claimed is:**

1           1.    An electronic device comprising:  
2           a base;  
3           an elastic member disposed on the base;  
4           a first cam disposed on the base in a manner such  
5           that the first cam is abutted by the elastic  
6           member, wherein the first cam rotates in a  
7           first direction and a second direction opposite  
8           to the first direction;  
9           a second cam disposed on the base in a manner such  
10          that the second cam is abutted by the first  
11          cam, wherein the second cam rotates along with  
12          the first cam when the first cam rotates in the  
13          first direction; and  
14          a third cam disposed on the base in a manner such  
15          that the third cam is abutted by the second  
16          cam, wherein the second cam is blocked by the  
17          third cam and is not rotated along with the  
18          first cam when the first cam rotates in the  
19          second direction.

1           2.    The electronic device as claimed in claim 1,  
2           wherein the first cam includes a first curved surface at  
3           a side abutted by the second cam, and the first curved  
4           surface includes a first portion and a second portion  
5           parallel to the first portion, and the second cam  
6           includes a second curved surface at a side abutted by the  
7           first cam, and the second curved surface includes a third  
8           portion and a fourth portion parallel to the third

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9 portion, and the first portion and the second portion are  
10 engaged with the third portion and the fourth portion,  
11 and the first cam automatically rotates to a first  
12 predetermined angle by the first portion, the second  
13 portion, the third portion, and the fourth portion when  
14 the first cam rotates to a second predetermined angle in  
15 the second direction due to external force.

1 3. The electronic device as claimed in claim 2,  
2 wherein the first curved surface further includes a fifth  
3 portion, a sixth portion, a seventh portion, and an  
4 eighth portion, and the fifth portion is connected to the  
5 first portion, and the sixth portion is connected to the  
6 second portion and the fifth portion, and the seventh  
7 portion is connected to the second portion, and the  
8 eighth portion is connected to the first portion and the  
9 seventh portion, and the fifth portion and the seventh  
10 portion are conjugate to each other with respect to a  
11 central axis of the first cam, and the sixth portion and  
12 the eighth portion are conjugate to each other with  
13 respect to the central axis of the first cam.

1 4. The electronic device as claimed in claim 3,  
2 wherein the second curved surface further includes a  
3 ninth portion, a tenth portion, an eleventh portion, and  
4 a twelfth portion, and the ninth portion is connected to  
5 the third portion, and the tenth portion is connected to  
6 the fourth portion and the ninth portion, and the  
7 eleventh portion is connected to the fourth portion, and  
8 the twelfth portion is connected to the third portion and  
9 the eleventh portion, and the ninth portion and the

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10 eleventh portion are conjugate to each other with respect  
11 to a central axis of the second cam, and the tenth  
12 portion and the twelfth portion are conjugate to each  
13 other with respect to the central axis of the second cam.

1 5. The electronic device as claimed in claim 4,  
2 wherein the fifth portion and the seventh portion  
3 correspond to the ninth portion and the eleventh portion,  
4 and the sixth portion and the eighth portion correspond  
5 to the tenth portion and the twelfth portion.

1 6. The electronic device as claimed in claim 2,  
2 wherein the first cam further includes a first fixed  
3 coupler opposite to the first curved surface.

1 7. The electronic device as claimed in claim 1,  
2 wherein the second cam includes a third curved surface at  
3 a side abutted by the third cam, and the third curved  
4 surface includes a thirteenth portion and a fourteenth  
5 portion parallel to the thirteenth portion, and the third  
6 cam includes a fourth curved surface at a side abutted by  
7 the second cam, and the fourth curved surface includes a  
8 fifteenth portion and a sixteenth portion parallel to the  
9 fifteenth portion, and the thirteenth portion and the  
10 fourteenth portion are engaged with the fifteenth portion  
11 and the sixteenth portion, and the first cam and the  
12 second cam automatically rotate to a third predetermined  
13 angle by the thirteenth portion, the fourteenth portion,  
14 the fifteenth portion, and the sixteenth portion when the  
15 second cam rotates to a fourth predetermined angle in the  
16 first direction by the first cam due to external force.

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1           8.    The electronic device as claimed in claim 7,  
2           wherein the third curved surface further includes a  
3           seventeenth portion, an eighteenth portion, a nineteenth  
4           portion, and a twentieth portion, and the seventeenth  
5           portion is connected to the thirteenth portion, and the  
6           eighteenth portion is connected to the fourteenth portion  
7           and the seventeenth portion, and the nineteenth portion  
8           is connected to the fourteenth portion, and the twentieth  
9           portion is connected to the thirteenth portion and the  
10          nineteenth portion, and the seventeenth portion and the  
11          nineteenth portion are conjugate to each other with  
12          respect to a central axis of the second cam, and the  
13          eighteenth portion and the twentieth portion are  
14          conjugate to each other with respect to the central axis  
15          of the second cam.

1           9.    The electronic device as claimed in claim 8,  
2           wherein the fourth curved surface further includes a  
3           twenty-first portion, a twenty-second portion, a twenty-  
4           third portion, and a twenty-fourth portion, and the  
5           twenty-first portion is connected to the fifteenth  
6           portion, and the twenty-second portion is connected to  
7           the sixteenth portion and the twenty-first portion, and  
8           the twenty-third portion is connected to the sixteenth  
9           portion, and the twenty-fourth portion is connected to  
10          the fifteenth portion and the twenty-third portion, and  
11          the twenty-first portion and the twenty-third portion are  
12          conjugate to each other with respect to a central axis of  
13          the third cam, and the twenty-second portion and the

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14 twenty-fourth portion are conjugate to each other with  
15 respect to the central axis of the third cam.

1 10. The electronic device as claimed in claim 9,  
2 wherein the seventeenth portion and the nineteenth  
3 portion correspond to the twenty-first portion and the  
4 twenty-third portion, and the eighteenth portion and the  
5 twentieth portion correspond to the twenty-second portion  
6 and the twenty-fourth portion.

1 11. The electronic device as claimed in claim 7,  
2 wherein the third cam further includes a second fixed  
3 coupler opposite to the fourth curved surface.

1 12. The electronic device as claimed in claim 1,  
2 wherein the base comprises:

3 a bottom portion on which the elastic member is  
4 disposed; and

5 a shaft portion integrally formed with the bottom  
6 portion, for passing through the elastic  
7 member, the first cam, the second cam, and the  
8 third cam.

1 13. The electronic device as claimed in claim 12,  
2 wherein the first cam includes a first through hole, and  
3 the second cam includes a second through hole, and the  
4 third cam includes a third through hole, and the first  
5 cam, the second cam, and the third cam are disposed on  
6 the bottom portion by the shaft portion passing through  
7 the first through hole, the second through hole, and the  
8 third through hole.

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1           14. The electronic device as claimed in claim 12,  
2           wherein the shaft portion includes a fourth through hole,  
3           and the third cam includes a fifth through hole  
4           corresponding to the fourth through hole, and the base  
5           further includes a pin for passing through the fifth hole  
6           and the fourth hole so that the third cam is fixed on the  
7           base.

1           15. The electronic device as claimed in claim 1,  
2           wherein the elastic member is a spring.

1           16. The electronic device as claimed in claim 1,  
2           further comprising:

3           a body including a first fixed hole, wherein a  
4           portion of the base and a portion of the third  
5           cam are disposed in the first fixed hole; and  
6           an upper housing portion, including a second fixed  
7           hole, disposed on the body in a manner such  
8           that the upper housing portion rotates in the  
9           first direction and the second direction with  
10          respect to the body, wherein another portion of  
11          the base, the elastic member, the first cam,  
12          the second cam, and another portion of the  
13          third cam are disposed in the second fixed  
14          hole, whereby the base and the first cam rotate  
15          along with the upper housing portion, and the  
16          second cam rotates by the upper housing portion  
17          via the first cam when the upper housing  
18          portion rotates in the first direction, and the  
19          second cam is blocked by the third cam and does

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20 not rotate along with the upper housing portion  
21 when the upper housing portion rotates in the  
22 second direction.

1 17. A hinge assembly comprising:  
2 a base;  
3 an elastic member disposed on the base;  
4 a first cam disposed on the base in a manner such  
5 that the first cam rotates in a first direction  
6 and a second direction opposite to the first  
7 direction;  
8 a second cam disposed on the base in a manner such  
9 that the second cam is abutted by the first  
10 cam, wherein the second cam rotates along with  
11 the first cam when the first cam rotates in the  
12 first direction; and  
13 a third cam disposed on the base in a manner such  
14 that the third cam is abutted by the second cam  
15 and the elastic member, wherein the second cam  
16 is blocked by the third cam and does not rotate  
17 along with the first cam when the first cam  
18 rotates in the second direction.

1 18. The hinge assembly as claimed in claim 17,  
2 wherein the first cam includes a first curved surface at  
3 a side abutted by the second cam, and the first curved  
4 surface includes a first portion and a second portion  
5 parallel to the first portion, and the second cam  
6 includes a second curved surface at a side abutted by the  
7 first cam, and the second curved surface includes a third  
8 portion and a fourth portion parallel to the third

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9 portion, and the first portion and the second portion are  
10 engaged with the third portion and the fourth portion,  
11 and the first cam automatically rotates to a first  
12 predetermined angle by the first portion, the second  
13 portion, the third portion, and the fourth portion when  
14 the first cam rotates to a second predetermined angle in  
15 the second direction due to external force.

1 19. The hinge assembly as claimed in claim 18,  
2 wherein the first curved surface further includes a fifth  
3 portion, a sixth portion, a seventh portion, and an  
4 eighth portion, and the fifth portion is connected to the  
5 first portion, and the sixth portion is connected to the  
6 second portion and the fifth portion, and the seventh  
7 portion is connected to the second portion, and the  
8 eighth portion is connected to the first portion and the  
9 seventh portion, and the fifth portion and the seventh  
10 portion are conjugate to each other with respect to a  
11 central axis of the first cam, and the sixth portion and  
12 the eighth portion are conjugate to each other with  
13 respect to the central axis of the first cam.

1 20. The hinge assembly as claimed in claim 19,  
2 wherein the second curved surface further includes a  
3 ninth portion, a tenth portion, an eleventh portion, and  
4 a twelfth portion, and the ninth portion is connected to  
5 the third portion, and the tenth portion is connected to  
6 the fourth portion and the ninth portion, and the  
7 eleventh portion is connected to the fourth portion, and  
8 the twelfth portion is connected to the third portion and  
9 the eleventh portion, and the ninth portion and the



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10       eleventh portion are conjugate to each other with respect  
11       to a central axis of the second cam, and the tenth  
12       portion and the twelfth portion are conjugate to each  
13       other with respect to the central axis of the second cam.

1           21. The hinge assembly as claimed in claim 20,  
2       wherein the fifth portion and the seventh portion  
3       correspond to the ninth portion and the eleventh portion,  
4       and the sixth portion and the eighth portion correspond  
5       to the tenth portion and the twelfth portion.

1           22. The hinge assembly as claimed in claim 18,  
2       wherein the first cam further includes a first fixed  
3       coupler opposite to the first curved surface.

1           23. The hinge assembly as claimed in claim 17,  
2       wherein the second cam includes a third curved surface at  
3       a side abutted by the third cam, and the third curved  
4       surface includes a thirteenth portion and a fourteenth  
5       portion parallel to the thirteenth portion, and the third  
6       cam includes a fourth curved surface at a side abutted by  
7       the second cam, and the fourth curved surface includes a  
8       fifteenth portion and a sixteenth portion parallel to the  
9       fifteenth portion, and the thirteenth portion and the  
10       fourteenth portion are engaged with the fifteenth portion  
11       and the sixteenth portion, and the first cam and the  
12       second cam automatically rotate to a third predetermined  
13       angle by the thirteenth portion, the fourteenth portion,  
14       the fifteenth portion, and the sixteenth portion when the  
15       second cam rotates to a fourth predetermined angle in the  
16       first direction by the first cam due to external force.

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1           24. The hinge assembly as claimed in claim 23,  
2 wherein the third curved surface further includes a  
3 seventeenth portion, an eighteenth portion, a nineteenth  
4 portion, and a twentieth portion, and the seventeenth  
5 portion is connected to the thirteenth portion, and the  
6 eighteenth portion is connected to the fourteenth portion  
7 and the seventeenth portion, and the nineteenth portion  
8 is connected to the fourteenth portion, and the twentieth  
9 portion is connected to the thirteenth portion and the  
10 nineteenth portion, and the seventeenth portion and the  
11 nineteenth portion are conjugate to each other with  
12 respect to a central axis of the second cam, and the  
13 eighteenth portion and the twentieth portion are  
14 conjugate to each other with respect to the central axis  
15 of the second cam.

1           25. The hinge assembly as claimed in claim 24,  
2 wherein the fourth curved surface further includes a  
3 twenty-first portion, a twenty-second portion, a twenty-  
4 third portion, and a twenty-fourth portion, and the  
5 twenty-first portion is connected to the fifteenth  
6 portion, and the twenty-second portion is connected to  
7 the sixteenth portion and the twenty-first portion, and  
8 the twenty-third portion is connected to the sixteenth  
9 portion, and the twenty-fourth portion is connected to  
10 the fifteenth portion and the twenty-third portion, and  
11 the twenty-first portion and the twenty-third portion are  
12 conjugate to each other with respect to a central axis of  
13 the third cam, and the twenty-second portion and the

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14 twenty-fourth portion are conjugate to each other with  
15 respect to the central axis of the third cam.

1 26. The hinge assembly as claimed in claim 25,  
2 wherein the seventeenth portion and the nineteenth  
3 portion correspond to the twenty-first portion and the  
4 twenty-third portion, and the eighteenth portion and the  
5 twentieth portion correspond to the twenty-second portion  
6 and the twenty-fourth portion.

1 27. The hinge assembly as claimed in claim 23,  
2 wherein the third cam further includes a second fixed  
3 coupler opposite to the fourth curved surface.

1 28. The hinge assembly as claimed in claim 17,  
2 wherein the base comprises:

3 a bottom portion on which the elastic member is  
4 disposed; and  
5 a shaft portion integrally formed with the bottom  
6 portion, for passing through the elastic  
7 member, the first cam, the second cam, and the  
8 third cam.

1 29. The hinge assembly as claimed in claim 28,  
2 wherein the first cam includes a first through hole, and  
3 the second cam includes a second through hole, and the  
4 third cam includes a third through hole, and the first  
5 cam, the second cam, and the third cam are disposed on  
6 the bottom portion by the shaft portion passing through  
7 the first through hole, the second through hole, and the  
8 third through hole.

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1           30. The hinge assembly as claimed in claim 28,  
2 wherein the shaft portion includes a fourth through hole,  
3 and the first cam includes a fifth through hole  
4 corresponding to the fourth through hole, and the base  
5 further includes a pin for passing through the fifth hole  
6 and the fourth hole so that the first cam is fixed on the  
7 base.

1           31. The hinge assembly as claimed in claim 17,  
2 wherein the elastic member is a spring.